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Money for nothing: Estimating the impact of student aid on participation in higher education

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ABSTRACT

Understanding how higher education (HE) finance policy can affect HE decisions is important for understanding how governments can promote human capital accumulation. Yet there is a severe lack of evidence on the effectiveness of student aid in encouraging HE participation outside of the US, and none at all for the UK. This paper exploits a reform that took place in the UK in 2004, when maintenance grants were introduced for students from low income families, having been abolished since 1999. This reform occurred in isolation of any other policy changes, and did not affect students from relatively better off families, making them a potential control group. We use a difference-in-difference framework to estimate the effect of the reform on HE undergraduate participation. We find a positive impact of maintenance grants, with a £1000 increase in grants leading to a 3.95 percentage point increase in participation.

1. Introduction

Student aid is widely used as a tool to promote higher education participation among individuals from disadvantaged groups. Empirical evidence suggests such policies can be effective, with studies from the US (Dynarski, 2000, 2003; McPherson & Schapiro, 1991) finding increases in participation in Higher Education (HE) of 3–5 percentage points per $1000 spending on student grant aid.[1] However, there is a severe lack of evidence on the effectiveness of student aid outside of the US, and none at all for the UK. This is largely due to the challenging nature of causal inference in such empirical work. Two particular challenges are present. First, student aid is generally awarded to those from low-income backgrounds, rendering aid eligibility correlated with many other observable and unobservable factors that also affect an individuals' HE participation. Second, it is often the case that policy reforms affecting HE finance are implemented in packages, affecting the three main elements of HE finance (grants, fees and loans) simultaneously. This is particularly true in the UK context where the major reforms to date have included a complex mixture of changes to HE finance, making it very difficult to isolate the causal effects of grants on HE participation.

We overcome these challenges in this paper by exploiting a policy reform in the UK which affected students undertaking undergraduate degree courses in

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[1] Throughout we use the terms aid and grants interchangeably.

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higher education institutions.[2] Though the reform affected various elements of the HE finance package, it did so in a gradual manner over time. In particular, it introduced policy changes relating to grants two years in advance of any other changes (which related to student fees and loans). This reform to grants affected students from relatively poor families only. This reform to maintenance grants was one of the least publicised components of the 2004 UK Higher Education Act, which is mainly associated with the sweeping changes it introduced as and from 2006/2007 – in particular, the introduction of tuition fees of up to £3000 per year for all students, regardless of background, deferrable until after graduation using government-subsidised loans – quite a change from the previous up-front fees, means-tested at a maximum of £1200 per year. However, the Act also included the reintroduction of means-tested maintenance grants – which had been abolished in 1999 – to be phased in from the 2004/2005 academic year. The level was set at a maximum of £1050 per student for those with joint parental incomes of £22,500 or below,[3] before being further increased substantially from 2006/2007 to a maximum of £2700 per year. It is this latter reform – the re-introduction of grants in 2004/2005 – that provides the identification strategy in this paper.

We use this policy reform to estimate the impact of student aid on degree participation within a difference-in-differences framework. Since relatively better off students (those with parental incomes above £22,500 pa) were not affected by the introduction of grants, they are a valid control group, subject to caveats discussed later on. Moreover we provide evidence on the plausibility of the key common trends assumption across both groups in the years preceding the policy shift. Our paper thus presents rare evidence on the effectiveness of student aid in a European setting.

Using data from the UK Labour Force Survey (LFS) on the first-year degree participation decisions of young people from England, Wales and Northern Ireland,[4] our differences-in-difference estimates of the impact of the 2004/2005[5] increase in maintenance grants show that grants have a positive and significant impact on first-year degree participation. In particular, we find evidence that a £1000 increase in maintenance grants results in a 3.95 percentage point increase in degree participation. This finding, which survives a battery of robustness checks, is in line with results estimated in a number of similar studies from the US and Europe (Dynarski, 2003; Hemelt & Marcotte, 2008; Nielsen, Sorensen, & Taber, 2010). This is not all that surprising; whilst the UK HE finance system is somewhat different to the US and Europe, there is relative consistency in how these countries deliver centralised aid in the form of maintenance grants. We also find similar results from an alternative estimation strategy using instrumental variables.

The paper proceeds as follows. Section 2 provides some background on student aid and the related literature. Section 3 provides more detail on HE finance reforms in the UK over the past two decades. In Section 4 we describe the data used in the paper. In Section 5 we outline our methodology. In Section 6 we present the main results of the paper, the effects of the 2004 increase in maintenance grants on participation in HE. In Section 7 we present some robustness tests, including estimates using an instrumental variables methodology. Section 8 concludes.

2. Student aid: background and literature review

Student aid – also referred to as grants or subsidies – is widely used as a tool to encourage students from the least represented groups to enrol in HE, and thus to help alleviate the relatively tighter credit constraints facing young people from poor backgrounds compared to their better-off counterparts, resulting in a more efficient mix of participants in HE (Carneiro & Heckman, 2002). There may also be cause to subsidise poorer students for equity reasons. For instance, if young people from poor backgrounds are more likely to experience capital market failures or to lack information, then public subsidies could be justified on these grounds. Similarly, those from poorer backgrounds could be more likely to suffer from debt aversion, again justifying intervention in the form of non-repayable subsidies (Goodman & Kaplan, 2003).

Some argue, however, that student aid is unlikely to be effective; for instance Carneiro and Heckman (2002) argue that long-term factors are more important in predicting a youth's likelihood to go to college than the short-term liquidity constraints that subsidies are designed to alleviate. Thus, understanding whether maintenance grants have a role to play in determining HE decisions is crucial.

Our results are highly relevant to the UK HE system of finance going forward. Maintenance grants have continued to play an important role in the UK HE finance package. Despite the increasing share of the financial burden borne by students in the form of tuition fees and loans, UK government spending on student aid continues to grow – in 2009/2010, government spend on maintenance grants was £1050 m – versus the £722 m spend on student fee loans and £610 m on maintenance loans[6] – and reached

[2] Throughout we use the term 'degree' to specifically mean undergraduate degree.

[3] Students are assessed on joint parental income. If a student's parents are divorced or separated then they are assessed on the basis of the income of the parent they live with most of the time.

[4] We exclude Scotland from our analysis. Scotland experienced a significant departure from UK HE policy in 2000 and made a number of significant changes including abolishing tuition fees, lowering student loans and introducing an endowment of around £2200 per student, to be paid upon graduation. This renders the Scottish system very different from the system that covers the rest of the UK. As a student' treatment largely depends on their country of residence rather than country of study (i.e. English students studying in Scotland would be ineligible for the grant and would still be eligible for tuition fees after their abolition in Scotland,) cross border flows of students are not problematic in this sense. Note that references to the UK in this paper refer to England, Wales and Northern Ireland – or the UK *excluding* Scotland.

[5] We use this notation throughout to denote the academic year commencing in September 2004 (for instance).

[6] All in 2009 prices. Sources: Student grant figures – Student Loans Company, Statistical First Release, 06/2009, Table 3. Maintenance loan and fee loan figures – DIUS Annual Report 2009, annex 1, Table 11. (This does not represent the amount of money lent to students, but the future cost of subsidising and writing off student loans issued in that year as well as management of the student loans stock).

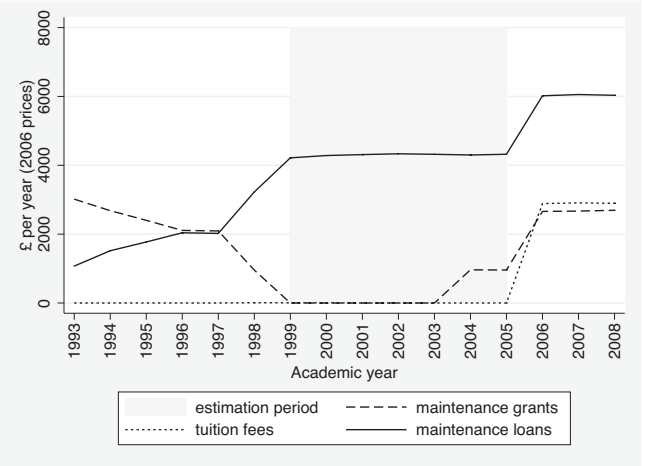

Fig. 1. Fee liability and grant and loan eligibility: parental income <£22,500 (treatment group).

'unsustainable' levels.[7] Spending on student aid is high across Europe, as well as the UK. But little European evidence exists as to whether and to what extent this aid has an impact on HE participation.

There is a sizeable body of US literature estimating the causal effects of maintenance grants on HE participation. Dynarski (2000) finds that Georgia's HOPE Scholarship, a merit-aid programme, had a positive impact on students: a $1000 increase in aid resulted in a 4 percentage point increase in HE participation. A later paper (Dynarski, 2003) exploits a one-off policy change whereby financial aid was withdrawn from children with a deceased, disabled or retired father, finding that the reform reduces HE participation by 3.6 percentage points. Kane (1995) looks at the impact of the Pell Grant aid system, finding no impact on participation, while Seftor and Turner (2002) find a small impact of Pell Grant eligibility of 0.7 percentage points per $1000 of aid (although on a restricted sample of mature students). More recently, Nielsen et al. (2010) exploit a change in aid in the Danish HE system which particularly benefitted higher income students, and find that a $1000 increase in grants results in a 1.35 percentage point increase in HE participation.

These results suggest an important role for maintenance grants in HE participation decisions. However, with the exception of Nielsen et al. (2010) for Denmark, they all relate to the US context. To the best of our knowledge, our paper is the first to examine the role of maintenance grants in the UK setting.

3. Institutional setting

3.1. HE policy reforms in the UK

We focus in this paper on a period of relative stability in UK HE finance – the period between 1999 and 2005. In this section we describe policy reforms to Higher Education leading up to and during this period.

The UK HE finance system traditionally consists of three main elements. These are: (a) maintenance grants (introduced in 1962), which are a non-repayable form of support and are means-tested according to parental income background; (b) maintenance loans (introduced in 1990), which are repayable as a percentage of earnings when the graduate is in employment and earning over a certain threshold (the exact terms and conditions have varied over time though were unchanged during the period of our investigation); and (c) tuition fees (introduced in 1998/1999), which have changed in level and nature over time, being means-tested and up-front from the period 1998/1999–2005/2006, and then deferrable and backed by a tuition fee loan from 2006/2007 onwards. As is relatively common in Europe, but in contrast to the US, the UK system was firmly rooted in the public sector during our period of interest.[8] Thus, the three elements of HE finance were set centrally by the government, and not by Higher Education Institutions (HEIs).[9]

Figs. 1 and 2 depict the changes in tuition fees, maintenance loans and maintenance grants during our period of interest, while Table 1 sets out the mean values of grants, fees and loans respectively, for students with parental backgrounds below £22,500 (hereon referred to as the 'treatment group') and with parental income backgrounds at or above £22,500 (the 'control group'). Shaded areas show the period used in the estimation, 1999–2005.

[7] According to an independent review of higher education finance in the UK, known as the Browne Review (2010, p. 56).

[8] There was just one private degree awarding institution in operation during this period, the University of Buckingham. Two further private institutions (BPP and the New College of Humanities) have since begun awarding degrees in the UK.

[9] From 2006, universities notionally gained control over fee setting although these were capped at £3000 per annum which was binding for practically all. The fee cap was lifted to £9000 per year in 2012 introducing more control over fee setting for universities. This initially resulted in little variation (average fees were around £8600), though variation has increased as a result of additional incentives for universities to cut fees.

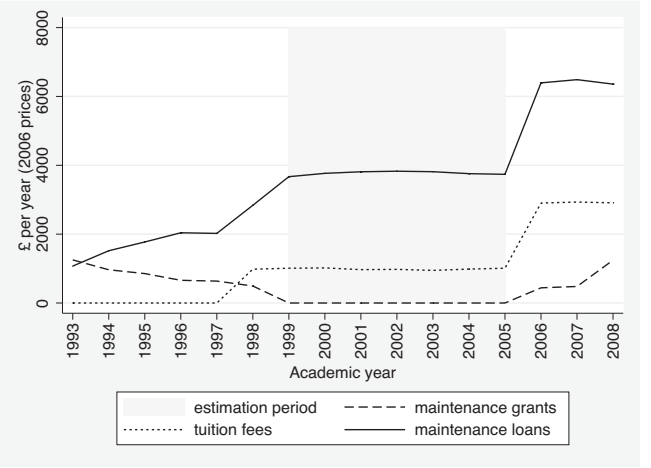

Fig. 2. Fee liability and grant and loan eligibility: parental income ≥£22,500 (control group).

The first major policy shift occurred in 1998. At this time, HE participation stood at around 40% (30%) of all 18–30 (17–20) year olds (HEPI, 2009; Public Accounts Committee, 2009). Despite this, however, there was concern that the gap in HE participation between rich and poor was very wide in comparison with other developed countries (Barr & Crawford, 1998), with concerns that it was growing even wider (Blanden, Gregg, & Machin, 2005).

Thus in 1998, the UK Government introduced up-front means-tested tuition fees of £1200 per annum (pa), affecting just over half of new undergraduate degree student entrants (students already enrolled were unaffected by this reform – as is the case for all the reforms that we discuss in this paper) at the time. Such a fee level was modest in comparison to the US, but relatively high in comparison to public universities in other countries in Western Europe such as France and Germany.[10] More relevant for this paper, the reforms also resulted in the abolition of means-tested maintenance grants from 1999 onwards, affecting just over half of all undergraduate degree entrants – those from poorer backgrounds.

No further reforms to HE finance policy were put in place until the 2004 Higher Education Act. This Act again principally affected prospective undergraduate degree students, and is mainly known for the sweeping changes to fees it introduced, in the form of tuition fees deferrable until after graduation through the provision of government loans.[11] It also introduced large increases in maintenance grants of up to £2700 for the poorest students. Crucially, the increase in grants was phased in two years before any of the other changes, from 2004/2005 as opposed to 2006/2007 – and only affected those with parental incomes of £22,500 or below – as is evident in Fig. 1. This provides exogenous variation in grants only and thus, we will argue, a credible source of identification for estimating the effects of non-repayable student support on HE degree participation. In particular, we exploit the fact that there were no policy changes to HE finance between 1999/2000 and 2003/2004, followed by a period of two years that saw the introduction of maintenance grants for relatively poor students in isolation of any other policy changes. We estimate the impact of the reform to maintenance grants on those affected by it, using those unaffected as a control group, under the assumption of common pre-reform trends, which we will discuss in detail later on.

In terms of the level of grants from 2004/2005 (which, as already discussed, had been scrapped in 1999/2000), the new grants were means-tested to a maximum of £1050 pa for students from parental income backgrounds <£15,000 pa and tapered to zero for students with parental income exceeding £22,500 pa. This was the level of aid that remained in place in both 2004/2005 and 2005/2006 – and is illustrated in Fig. 3 below for 2004 (2005 thresholds are very similar and not shown).[12] It is notable from Fig. 3 that the vast majority of our treatment group have parental income backgrounds below £15,000 pa with the implication that the average maintenance grant in our treatment sample is close to the full amount, at £963 pa.

In 2006/2007, there were considerable changes to the tuition fee and loans systems, as well as a further increase in maintenance grants. We thus focus on the period 1999/2000 through 2005/2006 to identify the effect of maintenance support on degree participation.

[10] Public universities in France and Germany charge low or no fees, though private universities can charge significantly more (see the International Comparative Higher Education Finance Project, available at http://gse.buffalo.edu/org/inthigheredfinance/project_profiles.html).

[11] Fee loans were available at a zero real interest rate, repayable according to income (at 9% above a threshold of £15,000). Unlike its predecessor, the fee, which could be up to £3000 per year, was not means-tested. Maintenance loans remained pretty much unchanged, though they were reduced slightly for students who saw a grant increase in 2006/2007. Dearden, Fitzsimons, and Goodman (2004) and Dearden, Fitzsimons, Goodman, and Kaplan (2008) contain more details.

[12] As is apparent from Fig. 1, another suitable method of evaluation for this policy could be to use a Regression Kink Design (RKD). However, as will become clear later on, our sample size precludes the possibility of gaining robust estimates using RKD.

Table 1
Tuition fees and maintenance grants for undergraduate degree students (£pa).

Academic year	Parental income <£22,500: treatment group			Parental income ≥£22,500: control group		
	Loan	Grant	Fee	Loan	Grant	Fee
1993	1072	3018	0	1072	1252	0
1994	1518	2682	0	1518	966	0
1995	1773	2402	0	1773	854	0
1996	2040	2109	0	2040	659	0
1997	2022	2094	0	2022	636	0
1998	3227	956	0	2838	493	982
1999[b]	4217	0	0	3670	0	1010
2000	4284	0	0	3766	0	1019
2001	4311	0	0	3812	0	969
2002	4335	0	0	3829	0	977
2003	4320	0	0	3814	0	947
2004	4300	963	0	3757	0	985
2005	4321	958	0	3738	0	1010
2006[a]	3130	2661	2889	3490	442	2904
2007	3147	2670	2908	3555	481	2933
2008	3136	2693	2897	3448	1245	2910

[a] A £3000 tuition fee loan was also available from 2006/2007 onwards. Maintenance loan amounts depend on whether the student is attending a London or non-London higher education institution, and whether (s)he is living at home or away from home; the figures in this table refer to non-home, outside London.
[b] Shaded areas denote the estimation period.

As illustrated in Fig. 1, for poorer students, the only element changing during the (shaded) period is grants (note also that the treatment group was not affected by the introduction of tuition fees in 1998 since only those from richer backgrounds were eligible for the fees). As illustrated in Fig. 2 meanwhile, there were no policy changes implemented during this period for relatively better off students, the control group.[13]

3.2. HE age-entry rules

As well as academic attainment requirements,[14] in the UK, eligibility for the first year of HE is determined by date of birth. This is because in the UK, English schooling laws are such that individuals enrol in school in the academic year (starting September) just after turning 4 (so they must be aged 4 by August 31st to attend in that academic year). Individuals leave school at age 18 or 19, after 14 years of schooling.[15] Therefore, youths become eligible for HE if they are aged 18 before August 31st of that academic year. This means that young people can be aged either 18 or 19 when they first become eligible for HE. It is therefore necessary to know an individual's exact birth date in order to know the academic year that individuals become eligible for HE, and thus the HE finance policy they are subject to.

4. Data

The objective of the paper is to estimate the effect of maintenance grants on the decision to enrol in an undergraduate degree programme at a higher education institution. Our sample comprises individuals who are *eligible for the first year* of HE regardless of prior educational attainment, or in other words, individuals who are of the appropriate 'academic age' (used hereon) for the first year of HE.[16] Our paper is the first empirical study to focus on the effect of HE finance policies on entry to higher education rather than on the decision of students to continue at HE in any particular year.[17]

We use data from the UK Labour Force Survey (LFS) over the period 1993 through 2006. This follows approximately 60,000 households every quarter, with households interviewed for five consecutive quarters (i.e. waves 1–5, so wave 1 and wave 5 are one year apart) and then removed from the panel and replaced with a new household. This design means that it contains information on individuals living at home in the year before they are eligible for higher education ($t-1$), as well as their higher education enrolment decision a year later (t). Moreover, it records individuals' date of birth and parental income, and has adequate sample sizes to allow for robust estimation. This

[13] Note that HE finance policy changes occurring during the duration of their course do not affect students – the maintenance grant on entry remains the same throughout the lifetime of their course.
[14] Entry requirements vary by institution but generally students are required to have a minimum of 2–3 A-levels (the academic qualification offered by educational institutions to students completing secondary or pre-university education).
[15] In fact, during our period of interest, youths could leave school at age 16; though doing so would almost certainly preclude them from entering university since academic entry qualifications (discussed above) are generally taken in post-compulsory schooling at age 17–18.
[16] Having access to exact date of birth allows us to advance on studies such as Blanden and Machin (2004) where individuals in certain age ranges are observed over time, without precise knowledge of the specific HE policies they are subject to.
[17] This is because we are unable to ascertain which HE policy individuals who have *already* left school are subject to: for those in university, we do not observe the year in which they began studying and hence the relevant HE finance policy in place at that time; for those not in education, it is more difficult to observe parental income, as they are less likely to be living at home in the previous period and thus we are less likely to observe their parents.

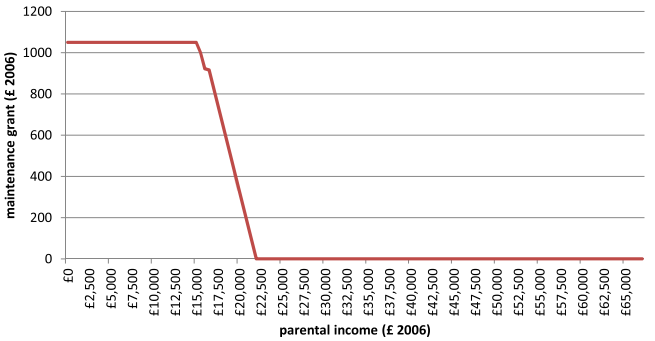

Fig. 3. Maintenance grant eligibility by parental income, 2004.

is the only UK data source to combine all of these pieces of information, which are necessary for this analysis.

We begin with 31,659 students of academic age, spread across 1993–2008 (for every available year in the LFS). We drop individuals who either live away from home and therefore whose parental income is unobserved (4296 individuals), and those who live at home but whose parental income is missing (3936 individuals). This is because we are unable to estimate parental income and therefore maintenance grant, fee or loan eligibility for this group.[18] This leaves us with a final sample of 23,427 individuals (almost three quarters of the original sample). For each of these individuals, we use his/her date of birth to map on the HE finance policy (s)he is subject to. To calculate exact eligibility for grants and fees, we combine information on their parental income with the HE policies in place in that particular year of eligibility, as described next.

To calculate an individual's fee liability and grant and loan eligibility, we apply the relevant means-testing formulae to parental income.[19] Amongst our final sample, for 12% we observe parental income in the year prior to HE decision, which is the relevant figure for means-testing; for the remainder, parental income is observed the year of the HE decision; however as income is fairly stable across adjacent years,[20] we use this to impute lagged income, adjusted for inflation. This introduces some random noise and makes our estimates less precise, though is unlikely to have any substantive effect on the estimates.[21]

Table 2 shows summary statistics and sample means for all of the variables used in the analysis. The main outcome variable is 'attending first year of HE, undergraduate degrees only'. The average participation rate across the sample is 17.6% of individuals of academic age,[22] though this varies considerably by parental income, and therefore for our treatment and control groups, as we will see. Other variables of interest in the table include gender, ethnicity (a binary variable taking the value 1 if the individual is white and 0 otherwise), a dummy variable for youth's age when they first became eligible for higher education (taking the value 1 if the youth became eligible for higher education within six months of turning 18 ('younger'), and 0 if they became eligible for higher education when older than this[23]), prior educational attainment (measured as having 5 or more good GCSEs[24] or less than 5 good GCSEs), education level of each parent (measured in four categories of attainment using the National Qualification Framework of both educational and vocational qualifications) and main UK region. Note that region represents the region of home domicile of the individual.[25]

[18] Note that this group with missing household income look very similar to those in our sample, though they are slightly less likely to be white, and are slightly better educated. We find that the group who live away from home are also largely similar to those in our chosen sample (although we have no information on their parental characteristics) but are more likely to be female.

[19] We observe parental earnings, as opposed to parental income, in the LFS. We therefore use earnings as a proxy for income.

[20] For those for whom we observe current and previous year's income, the correlation is 0.75.

[21] Note that for the years of 1993–1996, parental income was only recorded in wave 5, so it is not possible to observe previous year's income for any of those 4 years.

[22] While overall UK participation is considerably higher than this, our sample is restricted to the cohort of university eligible school leavers (made up of some 18 year olds and some 19 year olds), depending on date of birth. While we cannot find a directly comparable official measure of participation, government statistics (National Statistics, March 2012) imply that such students constitute less than half of total UK university participants, with figures for 2009 showing a participation rate of 22.5% of all 18 year olds, and 11.1% of all 19 year olds.

[23] As described in footnote 2, youths become eligible for school if they are aged 18 before August 31st of that academic year. This means those born in summer months enter school, and therefore university, at a younger age than those born from September 1st onwards. This variable can be calculated where we have information on the date of birth of the student (only available in our sample between 1993 and 2005).

[24] GCSEs are the set of qualifications taken by UK pupils at the end of compulsory schooling aged 15/16 and are thus an important and widely used measure of ability of the student as well as their previous performance in school exams. They are standardised across the country so results of every child are comparable. GCSEs are graded A*–G, and generally grades A*–C are considered to be the minimum requirement for employers and educational institutions. Hence, we define a good GCSE as one graded A*–C, and our GCSE variable is as equal to 1 if the student has 5 or more GCSEs graded A*–C, and 0 otherwise.

[25] So students and non-students living in a region away from home have their home domicile as their region, rather than the region of the institution they are attending/place they are working. Note, in this respect, that HE finance is dependent on country of *domicile* rather than on country of institution.

Table 2
Summary statistics (Labour Force Survey 1993–2008).[a]

Variable	Mean (sd)	Variable	Mean (sd)
HE degree participation	0.18 (0.38)	*Parental education:*	
Parental income:		**Father**: has no qualifications	0.13 (0.33)
<£22,500: treatment group	0.61 (0.49)	NVQ level 4 or above	0.19 (0.39)
≥£22,500: control group	0.39 (0.49)	NVQ level 3	0.10 (0.30)
Gender		NVQ level 2	0.20 (0.40)
Male	0.54 (0.50)	NVQ level 1	0.14 (0.34)
Female	0.46 (0.50)	Missing	0.25 (0.43)
Ethnicity		**Mother**: has no qualifications	0.23 (0.42)
White	0.85 (0.36)	NVQ level 4 or above	0.20 (0.40)
Non-white	0.08 (0.28)	NVQ level 3	0.08 (0.27)
Missing	0.06 (0.23)	NVQ level 2	0.21 (0.41)
Age first eligible for HE		NVQ level 1	0.22 (0.41)
Younger	0.41 (0.49)	Missing	0.06 (0.23)
Older	0.38 (0.49)	*UK region*	
Missing	0.21 (0.40)	England	0.89 (0.32)
Prior educational attainment:		Northern Ireland	0.06 (0.23)
Less than 5 GCSEs	0.18 (0.38)	Wales	0.06 (0.23)
More than 5 GCSEs[b]	0.56 (0.50)		
Missing	0.26 (0.44)		
N	23,427		

[a] Sample shown is all those age-eligible for first year of higher education.
[b] This is the expected level of attainment by the end of compulsory education in the UK.

5. Methodology

As discussed already, the policy reform that we use to estimate the effect of maintenance grants on HE degree participation is the phase-in of maintenance grants from 2004/2005.

We will use a difference-in-difference framework to estimate the effect of grants on HE degree participation, effectively comparing changes over time in HE degree participation amongst those affected by the above policy change to changes over time in HE degree participation amongst those unaffected by it. Difference-in-differences is appropriate since we will estimate the impact of a policy change which occurred at a particular moment in time (2004/2005) and affected a particular group (low income students). The presence of a 'clean' comparison group (high income students) that is unaffected by the policy change, and the fact that both groups were unaffected by any policy changes in the years leading up to the increase in grants, makes difference-in-difference the appropriate methodology to analyse the 'natural experiment' arising from the reintroduction of grants.

The treatment group is individuals of academic age (defined as in Section 3.2) whose parents earn less than £22,500 pa and the control group is those whose parents earn more than £22,500 pa. One important condition which must be satisfied is that the treatment and control groups display common trends before the treatment. Therefore, we will provide visual evidence of common trends in degree participation across the two groups, and we will also test this assumption in a regression framework. We will also provide robustness exercises in a later section. In the analysis we also control for important observed factors which may impact an individuals' decision to participate in HE, including gender, ethnicity and age first eligible for higher education. We also control for prior educational attainment of the student (GCSE attainment) as described in Section 4. This is a particularly important control since several studies (e.g. Chowdry, Crawford, Dearden, Goodman, & Vignoles, 2013) emphasise the important role of prior educational attainment in higher education participation, especially for the most disadvantaged students. Finally, we control for education level of each parent and UK region, variables which were described in Section 4.

An important aspect of the grant phase-in concerns the timing of the policy announcement, which was in early 2004,[26] just 7 days before the deadline for HE applications for the 2004/2005 academic year.[27] With such a short period between the announcement and the application deadline, individuals applying for 2004/2005 would in all likelihood not have had time to react to the announcement of the forthcoming grant introduction and to incorporate it into their application decision. However, those of academic age for the 2005/2006 academic year would have been aware of the policy change for a year, making it more likely to see the grant increase affecting this group of individuals. For this reason, in the empirical analysis we will separate out the effects in both years.

We also note that 2005 is the year before the major 2006 reforms were enacted, and thus a concern over anticipation effects may arise. This is an important issue and one which we carefully investigate; we come back to it in Section 5.2 where we provide several pieces of evidence suggesting that this is unlikely to be an issue.

[26] To be precise, the announcement was made on January 8th 2004 in the first reading of the Higher Education Bill.
[27] See http://www.ucas.com/students/importantdates – the deadline for the majority of applications is January 15th.

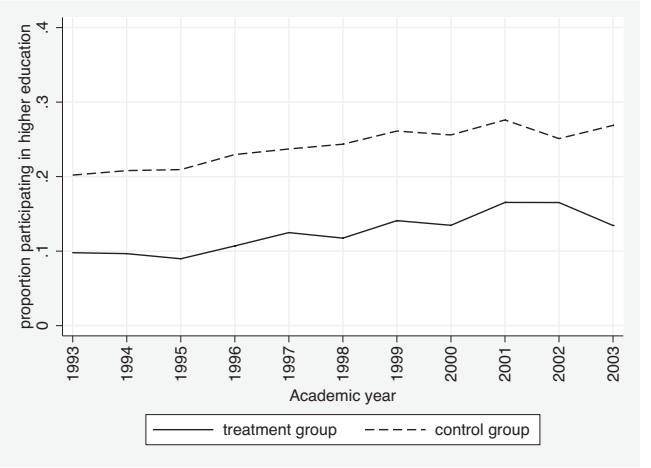

Fig. 4. Degree participation, pre-treatment period: treatment vs control.

Table 3
Probability of first-year degree participation at age 18–19.

Variables	
Treatment	−0.03
	(0.02)
Year = 1999	0.00
	(0.02)
Year = 2000	−0.01
	(0.02)
Year = 2001	0.01
	(0.02)
Year = 2002	−0.01
	(0.02)
Treatment × 1999	−0.01
	(0.03)
Treatment × 2000	0.01
	(0.03)
Treatment × 2001	0.01
	(0.02)
Treatment × 2002	0.03
	(0.02)
Constant	−0.03
	(0.02)
Observations	7888
R-Squared	0.02
Controls	Y

Standard errors in parentheses.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

5.1. Common trends

The first issue we address concerns the appropriateness of our control group. As is well-known, the key assumption for identification using difference-in-differences is that trends in degree participation over time are similar for treatment and control groups in the period preceding the reforms (pre-2004/2005 academic year). Whilst this assumption cannot be tested, it is useful to compare trends in degree participation between treatment and control groups pre-2004/2005. Whilst Fig. 4 shows that the trends do indeed look similar, we assess the validity of the common trends assumption by testing whether the trend in the treatment group is statistically different from the trend in the control group. We estimate the yearly difference between the treatment and control groups for each year leading up to the policy change in 2004, shown in Table 3. We also include a treatment dummy (to pick up the average difference between treatment and control groups) and year dummies (2003/2004 omitted), as well as control variables (as described in Section 4). None of the treatment effect-year dummies are statistically significant (or jointly significant), providing evidence that the treatment and control groups share common trends in the years leading up to the policy change and giving us no reason to believe that they would not have been the same going forward in the absence of any reforms.

5.2. Anticipation effects and deferral rules

As discussed, we have two years of post-reform data: 2004/2005 and 2005/2006. The latter precedes another set of reforms, raising the concern that it may reflect behavioural changes in anticipation of the new reforms. The particular concern here is that students who were eligible for higher education in 2005/2006 and who would – in the absence of any reforms – have taken a gap year and postponed entering their degree programme to 2006/2007 (or later) may have chosen to enrol in their degree programme in 2005/2006 in order to avoid the fee. If such students are disproportionately found in the treatment group, our estimate may be biased upwards.

However, this concern is greatly alleviated by the fact that in the period we are considering, individuals could enrol in a degree programme in the year before the fee increase (2005/2006), and then defer for at least a year *whilst retaining the fees applicable on enrolment*.[28] This is made clear by Clark (2010), "The plan [for the 2012/2013

[28] The ability to defer entry and at the same time avoid a tuition fee increase has since been abolished.

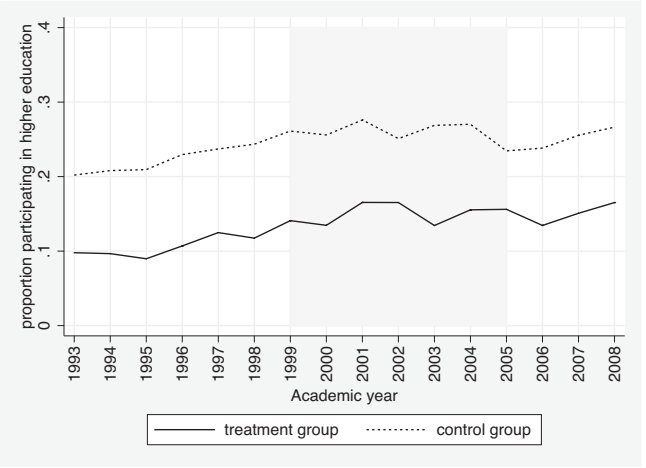

Fig. 5. Degree participation over time, treatment and control groups.

Table 4
Degree participation (probability at age 18/19) proportion participating in HE.

	1999/2000–2003/2004	2004/2005	2005/2006	Change (2004/2005)[a]	Change (2005/2006)
<£22.5k (treatment)	0.149	0.155	0.156	0.007 (0.013)	0.007 (0.012)
≥£22.5k (control)	0.263	0.270	0.235	0.007 (0.018)	−0.028 (0.018)
(Treatment-control)	−0.114 (0.008)***	−0.115 (0.02)***	−0.079 (0.019)***		
Difference-in-difference (2004/2005)				−0.001 (0.022)	
Difference-in-difference (2005/2006)					0.036 (0.021)*

[a] Grants introduced near HE application deadline in 2004.
Standard errors in parentheses.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

academic year] contrasts with the arrangements made the last time fees increased significantly – in 2006 – when they rose from £1200-a-year to £3000-a-year. Then, students applying in 2005 for deferred entry in 2006 were allowed to pay at the lower rate amid fears of a mass scramble for places".

So any student who intended to take a gap year could still do so and avoid the higher fee, meaning there should be no financial incentive to be had from not taking a gap year in 2005/2006 and instead enrolling straight away. Evidencing this, 7.5% of accepted applicants chose to defer entry in 2004/2005 – and there was no discernible break in trend of deferral rates in the years around our estimation period – suggesting students did not behave differently because of the forthcoming fee.[29]

6. Results

In this section we present estimates of the effect of maintenance grants on first year HE degree participation.

Fig. 5 illustrates HE participation over time, separately for the treatment and control groups, over the entire period for which we have data – 1993/2004 through 2008/2009. As it happens, the treatment (control) group broadly corresponds to those with parental income backgrounds below (above) UK median income,[30] making our analysis all the more informative from a policy perspective. As Fig. 5 shows, degree participation is strongly positively correlated with parental income (the determinant of whether an individual is treatment or control). On average over the entire period of 1993–2008,[31] inequality was high – 13.5% of individuals from the treatment group participated in HE, compared with 24.8% of individuals from the control group – and it is also clear that the gap in

[29] See http://www.ucas.com/about_us/stat_services/stats_online/data_tables/deferring.

[30] Estimates for weekly median income in 2010/2011 are approximately £419 per week, which equates to around £20,000 pa in 2006 prices (IFS, 2012).

[31] We choose this period since this is the entire sample of LFS data available at the time of analysis. While we do not go beyond 1995–2005 in our estimation, we use the entire sample for various robustness checks including analysis of pre-reform trends, and to put the estimation period into context.

HE participation between groups remained wide throughout this period.

6.1. Difference-in-difference analysis

Table 4 focuses on our period of interest, illustrating HE participation by treatment and control groups before and after the 2004 grant introduction. Note that, for reasons explained in Section 5 regarding students not having had sufficient opportunity to respond to the early increase in grants in the academic year 2004/2005, we show results for 2004/2005 and 2005/2006 separately.

As Table 4 shows, during the four year period between 1999/2000 and 2003/2004 – during which there were no maintenance grants – the gap in HE participation between the treatment and control groups was 11.4 percentage points (column 1).

Looking at 2004/2005, the first year of the maintenance grant introduction, we see no difference in HE participation amongst individuals in the treatment group compared to those in the control group (column 2). However, the increase in grants was announced just before the HE application deadline corresponding to 2004/2005 (see Section 5.2), meaning that HE applicants had very little time to react to it in their decision-making (or indeed may not even have been aware of it). In 2005/2006, however, individuals in the treatment group are 3.6 percentage points more likely to be participating in HE compared to individuals in the control group. As the only change to HE finance during this period relates to the introduction of grants, which affected the treatment but not the control group, we attribute this differential to this reform, and will probe this finding further in the analysis that follows.

Whilst Table 4 shows the 'raw' difference-in-difference estimates, we next estimate it in the following regression framework:

$$y_i = \alpha + \beta(treat * 2004_i) + \gamma(treat * 2005_i) + \delta treat_i + \theta 2004_i + \mu 2005_i + X_i + \upsilon_i \quad (1)$$

where the dependent variable y_i is a binary variable which takes the value 1 if the youth is enrolled in the first year of a HE degree and 0 otherwise. 2004_i is a variable equal to 1 if the youth first becomes eligible for HE for 2004/2005 academic year and 2005_i is equal to 1 if the youth is first eligible for HE for the 2005/2006 academic year. $Treat_i$ is a variable set to 1 if the youth's parental income is less than £22,500 pa, and 0 if the youths' parental income is equal to or above £22,500 pa. X_i denotes the characteristics listed in Table 2. We estimate Eq. (1) over the period 1999/2000–2005/2006. Note that since we do not observe take-up of maintenance grants among the treatment group, but just a proxy for eligibility, the parameters we estimate are intention-to-treat ones. The effect of maintenance grants on first year HE participation is given by the coefficients β and γ which capture the impacts separately in 2004/2005 and 2005/2006 respectively.

Estimates from Eq. (1) are shown in column 1 of Table 5. The point estimate for 2005/2006 remains very similar to the one shown in Table 4, at 3.8 percentage points, though is more precisely estimated and is statistically significant at the 5% level. Given the precision of our estimates, we cannot reject an effect as small as 0.001. Note also that the fall in HE participation among the control group in 2005/2006 is no longer statistically significant at conventional levels.

Table 5
Effect of maintenance grants on degree participation at age 18/19.

Independent variables	(1)	(2)	(3)
Treatment × 2004	−0.011	−0.009	−0.023
	(0.020)	(0.021)	(0.021)
Treatment × 2005	0.038**	0.040*	0.036*
	(0.019)	(0.021)	(0.020)
Year = 2004	0.006	0.004	0.006
	(0.015)	(0.017)	(0.015)
Year = 2005	−0.025	−0.031*	−0.025
	(0.016)	(0.018)	(0.016)
Treatment	−0.018**	−0.008	−0.020**
	(0.009)	(0.009)	(0.009)
Constant	0.111***	0.109***	0.115***
	(0.017)	(0.019)	(0.019)
Observations	11,286	10,082	10,973
R-Squared	0.154	0.163	0.175

Sample includes individuals eligible for first year of HE for all of UK except Scotland.
All models include full set of controls as listed in Table 2.
Standard errors in parentheses.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

As the average increase in maintenance grants over the period we consider was approximately £960 in real terms, this means that a £1000 increase in grants equates to a 3.95 percentage point increase in HE participation. Though not directly comparable due to differences in exchange rates, this estimate is in line with findings from other studies – Dynarski (2000, 2003) finds that a $1000 increase in student aid results in a 3.6–4 percentage point increase in participation for students in the US, and Nielsen et al. (2010) find that a $1000 increase in grants results in a 1.35 percentage point increase in HE participation for students in Denmark.[32]

7. Robustness

The results so far show that the group of students who were eligible for a new maintenance grant in 2004/2005 increased their HE participation after the reform by significantly more than those ineligible for the new grant. In this section we conduct three robustness exercises to probe this finding further. The first concerns our choice of control group; the second concerns the definition of our treatment group; and the third implements a different estimation strategy using instrumental variables.

Although we mitigated concerns around our choice of control group by showing it exhibits very similar pre-reform trends to the treatment group, in the second column of Table 5 we estimate the impact of the maintenance grant on HE participation using an alternative – narrower – control group, which is closer in terms of

[32] At the time of writing, $1000 was roughly equivalent to £630.

Table 6
Effect of maintenance grants on degree participation at age 18/19 (Placebo Tests).

Independent variables	(1)	(2)
Treatment × 2001	0.010	
	(0.022)	
Treatment × 2002		0.023
		(0.021)
Year = 2001	0.014	
	(0.018)	
Year = 2002		0.014
		(0.018)
Treatment	−0.024	−0.023*
	(0.015)	(0.012)
Constant	0.137***	0.134***
	(0.030)	(0.025)
Observations	4447	6195
R-Squared	0.191	0.184

Sample includes individuals eligible for first year of HE for all of UK except Scotland.
All models include full set of controls as listed in Table 2.
Standard errors in parentheses.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

Table 7
IV regression, dependent variable maintenance grant eligibility.

Independent variables	
First stage	
Average grant[a]	0.442***
	(0.025)
F-stat	76.79
Second stage	
Grant-eligible[a]	0.039
	(0.027)
Observations	10,804

Sample includes individuals eligible for first year of higher education for all of UK except Scotland.
Model includes full set of controls as listed in Table 2.
[a] Mean value by parental ed*region, based on parental income in year 1999.
[b] Omitted category is mother/father has no educational qualifications.
[c] Standard errors clustered at group level.
[d] 1 group contained no information so was dropped (region NI, parental education level missing, parental income level missing in 1999).
Standard errors in parentheses.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

parental income to the treatment group: those with annual parental incomes between £22,500 and £50,000.[33] The second column of Table 5 shows that the narrower control group yields very similar estimates to our main specification, and yields a treatment effect of 4 percentage points, which is very close to our original estimate and is significant at the 10% level.

Second, we vary the treatment group, by including in it just those eligible for the full grant of £1050 pa, and thus excluding individuals eligible for a partial grant. As the latter represent just about 10% of those eligible for a grant, the results are not impacted substantially, as shown in the third column of Table 5.

Third, we carry out some falsification tests. Our specific concern is that the relative increase in participation in the treatment group relative to the control group is driven by something other than the increase in grants, such as simply noise in the data. Visually examining movements in participation over our period of interest, there is some indication that in the period around 2001/2002 and 2002/2003, particularly in 2002/2003, participation fell among our control group but remained stable among our treatment group. As this is the same pattern that drives our relative increase in participation in 2005/2006 (the main result of this paper), we perform a robustness check as follows. We select as 'policy on' period the year 2001/2002, with the years preceding this (1999/2000–2000/2001) as our 'policy off' period. The specification remains otherwise the same as in Eq. (1), with our parameter of interest being the interaction between the treatment group and the year 2002/2001. As a second falsification test we repeat the exercise with our 'policy on' period the year 2002/2003, with the years preceding this (1999/2000–2001/2002) as our 'policy off' period. The results can be found in columns 1 and 2 of Table 6, where the treatment effect is found to be insignificant in both specifications.

Finally, we assess robustness of findings to a different estimation strategy, instrumental variables. Given that the level of the grant an individual is entitled to is a (non-linear) function of parental income, raising endogeneity concerns with estimating its impacts directly, we instead use instrumental variables to estimate its effect. We use as an instrument the average level of the grant by government office region (16 in total) and parental education level (4 categories) in 1999, chosen as our base year.[34] More specifically, we construct the instrument as follows:

1. Create average levels of income for every region/parental education level combination, as of 1999.
2. Assign all individuals in that region/parental education grouping, regardless of year, the 1999 value of parental income, inflated to the appropriate year (so for instance, for 2004, the 1999 income value is inflated to 2004).
3. Construct the individuals' grant entitlement based on that value of income and on the HE policies in place in each specific year, which serves as the instrument for the actual grant.

Note our reason for choosing a base year, rather than taking year-specific averages, is that year-specific averages may capture underlying trends in HE degree participation

[33] The proportion of our sample over the estimation period 1999–2005 with parental incomes above £50,000 pa is just 12%.

[34] Where two parents have different education levels, we take the higher of the two.

over time, and would thus not satisfy the exclusion restriction. Whilst this is not our preferred specification, as it relies on the identifying assumption that the interaction of region and parental education does not directly affect HE participation, we include it as it is free from any lingering concerns around anticipation effects (though as discussed in Section 5 these are unlikely to be an issue).

The first stage estimates in Table 7 show that the instrument is a strong predictor of the actual grant an individual is entitled to. Table 7 also shows the estimates from the second stage specification. The IV estimate suggests that a £1000 increase in grants results in a 3.9 percentage point increase in degree participation. This point estimate is extremely similar to the estimate from the difference-in-difference model, which is very reassuring given the different estimation methods, though is less precisely estimated in the IV framework.

8. Conclusion

Understanding how HE finance policy can affect higher education participation is important for understanding how governments can promote human capital accumulation. This paper exploits one element of the 2006 reforms to HE finance, in which maintenance grants for poorer students were phased in two years ahead of any other changes, in 2004, to estimate the effect of student aid on degree participation.

The policy change occurred in isolation of any others and did not affect relatively better off students, who we use as a control group to identify the effects within a difference-in-difference framework. We find evidence that maintenance grants positively affect degree participation, with a £1000 increase per year resulting in an increase in participation of around 3.95 percentage points.

Whilst this is a relatively sizeable effect, it does little to reduce the gap in enrolment between those from poorer and richer backgrounds, which stands at 15% and 26% respectively. The estimates are in line with other international studies of the impact of non-repayable subsidies on higher education participation. For instance, Dynarski (2003) finds a 3.6 percentage point increase in college participation from a $1000 increase in non-repayable aid. However her baseline enrolment rate is much higher, at 63%, reflecting the fact that her treatment group includes a wider range of income backgrounds of students. Our findings are also in line with studies by Hemelt and Marcotte (2008) and Nielsen et al. (2010) for Denmark.

Whilst we are able to identify a causal impact of subsidies on participation, our finding does not necessarily imply that students are debt averse or that they suffer from liquidity constraints. As Dynarski (2003) points out, an increase in subsidy is effectively a reduction in the cost of going to university. Thus our paper, similar to the studies above, is unable to disentangle the subsidy versus liquidity effects.

Since we study the impact of grants on participation of low-income students, our results are externally valid. The current UK system of grants (as well as that in other countries such as the US and Europe) continues to operate in the same manner as during the time of our study. Indeed, the system of centralised, means-tested maintenance grants continues to be an important element of the UK HE finance strategy with £1050 m committed towards such grants in 2009. This is particularly pertinent given the changes in the structure of HE finance over the last few years in the UK. Severe cuts to university funding have been carried out, with many courses no longer receiving government subsidies for teaching. At the same time, students are now expected to make very large contributions to their education through tuition fees which, at £9000 per year, have risen to some of the highest in the world. Because of these dramatic increases in costs, the UK government has emphasised their clear commitment to maintaining non-repayable subsidies for poor students, with the 2014 maximum student grant rising to approximately £3400 per year. These results underlie the importance of government commitment to non-repayable forms of upfront support such as maintenance grants for undergraduate degree participation.

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References

Barr, N., & Crawford, I. (1998). The Dearing report and the government's response: A critique. *Political Quarterly, 69*, 72–84.

Blanden, J., Gregg, P., & Machin, S. (2005). *Intergenerational mobility in Europe and North America*. London: Centre for Economic Performance.

Blanden, J., & Machin, S. (2004). Educational inequality and the expansion of UK higher education. *Scottish Journal of Political Economy, 51*, 230–249.

Browne Review (2010). *Securing a sustainable future for higher education in England*.

Carneiro, P., & Heckman, J. (2002). The evidence on credit constraints in post-secondary schooling. *The Economic Journal, 112*, 705–734.

Clark, L. (2010, November). Increase in university fees will kill off 2011 gap year as students fail to avoid charges hike. *The Daily Mail*.

Chowdry, H., Crawford, C., Dearden, L., Goodman, A., & Vignoles, A. (2013). Widening participation in higher education: Analysis using linked administrative data. *Journal of the Royal Statistical Society, Series A (Statistics in Society), 176*(2), 431–457.

Dearden, L., Fitzsimons, E., & Goodman, A. (2004). *An analysis of the higher education reforms*. Institute for Fiscal Studies (IFS) Briefing Note 45.

Dearden, L., Fitzsimons, E., Goodman, A., & Kaplan, G. (2008, February). Higher education funding reforms in England: The distributional effects and the shifting balance of costs. *The Economic Journal, 118*, F100–F125.

Dynarski, S. (2000). Hope for whom? Financial aid for the middle class and its impact on college attendance. *National Tax Journal, 53*, 629–661.

Dynarski, S. (2003). Does aid matter? Measuring the effect of student aid on college attendance and completion. *American Economic Review, 93*, 279–288.

Goodman, A., & Kaplan, G. (2003). Study now, pay later or HE for free? An assessment of alternative proposals for HE finance. *IFS Commentaries* IFS.

Hemelt, S. W., & Marcotte, D. E. (2008). *Rising tuition and enrollment in public higher education*. Institute for the Study of Labor (IZA) Discussion Paper 3827.

Higher Education Policy Institute (2009). *Male and female participation and progression in higher education*. HEPI.

Kane, T. (1995). *Rising public college tuition and college entry: How well do public subsidies promote access to college?* National Bureau of Economic Research (NBER) Working Paper 5164.

McPherson, M. S., & Schapiro, M. O. (1991). Does student aid affect college enrollment? New evidence on a persistent controversy. *American Economic Review, 81*, 309–318.

Nielsen, H. S., Sorensen, T., & Taber, C. (2010). Estimating the effect of student aid on college enrollment: Evidence from a government grant policy reform. *American Economic Journal: Economic Policy, 2*(2), 185–215.

Public Accounts Committee (2009, February). *Widening participation in higher education*. House of Commons Report.

Seftor, N. S., & Turner, S. E. (2002). Back to school: Federal student aid policy and adult college enrollment. *Journal of Human Resources, 37*, 336–352.